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SECURITY INFORMATION

PROVISIONAL INTELLIGENCE REPORT

PETROLEUM IN THE SOVIET BLOC

PETROLEUM IN THE ASIATIC SATELLITES

CIA/RR PR-17 (III-A)

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Note

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FOREWORD

This report is one of a series of provisional reports pertaining to petroleum in the Soviet Bloc. The entire series is intended to cover all phases of petroleum, natural gas, and synthetic liquid fuels in the Soviet Bloc. These reports are presented as an intermediate step in consolidating pertinent intelligence on the subject and not as a finished study. In the consolidation of the available information, various reports and documents representing research by other intelligence agencies were utilized along with the results of research and analysis by members of the staff of CIA.

It is intended that this series of reports will serve the following purposes:

a. Represent a base for contributions and additions by CIA and other agencies actively interested in petroleum intelligence.

b. Facilitate the selection of the specific and detailed gaps in intelligence warranting priority attention.

c. Provide the basis for a broad study on petroleum in the Soviet Bloc and various studies directed toward specific critical problems.

CONTENTS

	Page
Summary and Conclusions	1
Table 1. Supply of Petroleum Products in Asiatic Satellites by Sources and Estimated Civilian Consumption	5
1. Petroleum Production and Exploration	8
Table 2. Favorable Prospective Oil Basins in China	9
Table 3. Estimated Crude Oil Production in the Asiatic Satellites by Years and Production Forecast for 1952-53	16
2. Petroleum Refining	17
Table 4. Petroleum Refineries in China	18
3. Shale Oil, Synthetic Liquid Fuels, and Petroleum Substitutes	22
Table 5. Shale Oil and Synthetic Liquid Fuel Plants in China, Operating in 1951	24
4. Civil Consumption and Distribution	26
Table 6. Average Annual Imports of Petroleum Products from Western Sources into China (excluding Manchuria)	28
5. Petroleum Storage	29
Table 7. Distribution of Petroleum Storage at Ocean Terminals and Bulk Stations as of December 1941	29

III-A

PETROLEUM IN THE ASIATIC SATELLITES*

Summary and Conclusions

The Asiatic Satellites of the USSR are deficient in petroleum. These countries have always depended upon imports to meet most of their needs for petroleum products. However, these needs have never been large, comprising less than one percent of the world-wide consumption of such products.

Historically the importation of petroleum products into what are now the Asiatic Satellites has been handled almost entirely by US and British oil companies, so that the current embargo on shipments of petroleum products to Communist China from non-Communist sources has changed radically the flow of such products into the Asiatic Satellites.

Three exceptions to this historic pattern should be noted:

a. In Manchuria prior to World War II, the Japanese developed indigenous sources for petroleum products from oil shale and coal equal to the Manchurian demand of about 200,000 tons annually. 31/**

b. Outer Mongolia has been aligned economically with the USSR so that the very small demand there for petroleum products has been normally filled by imports from the Soviet Union.

c. Sinkiang, formerly called Chinese Turkestan, has had close racial and economic ties with the adjoining provinces of the USSR in Central Asia and had received petroleum imports from that direction.

* Asiatic Satellites comprise China with Manchuria, Inner Mongolia and Sinkiang; Outer Mongolia (Mongolian Peoples Republic), and North Korea.

25X1

Should this be exempted because of ORR stupidity in interpretation of political events?

In recent years Sinkiang and the adjoining province of Kansu have developed significant oil production. However, they are becoming so oriented economically and politically toward the USSR that this entire far northwest region of China is being integrated more into the Soviet Union than into China. This area contains the only proved oil reserves in China, and its future oil prospects are far superior to those of the remainder of the Asiatic Satellites. The USSR has been active in developing the petroleum resources of Sinkiang and Kansu. The production from the oilfields near Wusu in Sinkiang and near Yumen in Kansu, now supplies petroleum products to those provinces, and may eventually allow exports to adjacent USSR regions from Alma Ata on the West to the Altai Mountain area in the east, where extensive uranium mining operations have been reported.

For the present and short-term future, the following conclusions on the petroleum situation in the Asiatic Satellites appear to be valid on the basis of supporting data given herein:-

a. As a whole the Asiatic Satellites are a liability rather than an asset to the Soviet bloc with respect to petroleum.

b. The "normal" civilian demand for petroleum products in the Asiatic Satellites is about 2 million tons annually (Table 1 - 1947). This is very low compared with other comparable world regions, and would expand rapidly under favorable conditions. For example, in 1947 it was estimated that consumption of petroleum products in China would be 2.5 million tons in 1952. 14/

c. The "normal" civilian consumption of petroleum products in the Asiatic Satellites can be reduced drastically without disruption of the civilian economy.

The 1951 civil consumption rate is estimated at 500,000 tons annually of petroleum products. (Table 1). This is about one-fourth of the assumed "normal" rate.

d. Current restricted civilian consumption of petroleum products in the Asiatic Satellites, can be further reduced by stringent controls, and by forcing the extensive use of substitute fuels.

e. Currently the principal source of petroleum products for the Asiatic Satellites is from the USSR via the Trans-Siberian railway. As the far eastern regions of the USSR are deficient in petroleum, supplying the Asiatic Satellites imposes an additional transport burden on the Trans-Siberian railway.

Secondary sources of petroleum products for the Asiatic Satellites in 1952 are:

(1) Marine shipments from European Satellites.

(2) Smuggling of petroleum products through the embargo.

(3) Petroleum products from indigenous sources such as petroleum deposits, oil shale, synthetic liquid fuels, and benzol from coking plants. Also petroleum substitutes from agricultural sources are widely used in China, although the aggregate volume is relatively small at the present time.

Barring the lifting of the embargo on petroleum products from non-Communist sources, the "normal" civilian demand for petroleum products in the Asiatic Satellites of 2 to 3 million tons annually cannot be met before 1957. The synthetic liquid fuels plants built by the Japanese in Manchuria were not successful on a large scale, and the rebuilding and expansion of the shale oil industry to supply any substantial part of the total demand for petroleum products will take 3 to 5 years. The oilfields of Sinkiang and Kansu can be developed in the next 5 years, with the direct and substantial aid of the USSR, to yield 2 million tons annually of petroleum products.

if necessary. However, to distribute these products in the Asiatic Satellites would require a 2000-mile pipe line over rugged country while a 1400-mile line over smooth terrain would deliver them to Alma Ata in the USSR. 28/ Also existing highways can be improved to transport substantial quantities of petroleum products from Sinkiang and Kansu into the adjacent regions in the USSR but there is no adequate highway or rail transportation beyond Lanchow, the capital of Kansu in the direction of China proper. These facts together with the deliberate orientation by the Soviets of Sinkiang and Kansu toward the USSR will tend to limit the availability of petroleum products from those provinces to China proper or to North Korea.

The estimated availability and civil consumption of petroleum products in the Asiatic Satellites for the years 1950 to 1953 follows:

Thousand Metric Tons

Sources	Calendar Years 1950	1951	1952	Fiscal 1953
Imports - Western	200	150	50	50
Imports - Soviet bloc	386	617	763	750
Indigenous crude oil	115	149	202	250
Indigenous - other	40	54	98	100
Indicated total availability	741	970	1103	1150
Estimated civilian consumption	500	500	600	650

Table I summarizes the supply of petroleum products in the Asiatic Satellites with respect to sources, and also shows the estimated civil consumption of such products. Most of the consumption was in China proper including Manchuria, with minor consumption in Inner Mongolia, Sinkiang, and Outer Mongolia. Korean imports and consumption of petroleum products are not included in Table I as they cannot be broken down between North Korea and South Korea. In 1933-37 Korean

TABLE 1

Supply of Petroleum Products in Asiatic Satellites by Sources and Estimated Civilian Consumption

Thousand Metric Tons

Time Period	Sources of Petroleum Products Imports		Indigenous Production		Indicated Total Supply	Estimated civilian consumption
	Western sources	Soviet Bloc	From crude oil	From Shale oil & other		
1925 to 1928 Average Annual	968	10	0	0	978	900
1932 to 1937 Average annual	1146	15	0	91	1252	1166
1938 to 1941 Average annual	783	20	8	110	921	?
1942 to 1945 Average Annual	166	10	35	138	349	?
1946	874	10	37	15	936	?
1947	2046	20	42	17	2126	1847
1948	1616	30	59	20	1725	1451
1949	131	381	81	23	616	532
1950	200	385	115	40	740	600
1951	150	617	149	54	970	600
1952 a/	50 b/	760	202	98	1110	600
1953 a/	50 b/	735	302	113	1200	700

a. Estimates based upon previous trends and upon assumptions stated in text.

b. Smuggled thru embargo.

imports of petroleum averaged 270 thousand tons annually according to a mimeographed publication issued in May 1945 by the FEA, entitled "The Foreign Trade of Korea". 25X1

25X1

Some secondary data have been derived from these and other sources, or estimated by interpolation in a few cases where such data for certain years were unavailable.

The data shown for 1952 and 1953 are estimated by extrapolation with the following assumption:

a. Continuation of present embargo against movement of petroleum products from Western sources into Communist China.

b. That imports of petroleum products from the Soviet Bloc will be limited to 2000 tons daily in 1952, and that such imports will decrease slightly in 1953 as more petroleum products from indigenous sources become available.

c. Continued effort by Communist China with continued aid from USSR to restore and expand the output of petroleum products from indigenous sources, with emphasis on Manchurian shale oil.

d. Continued effort by the USSR to increase the output of petroleum products from oil deposits in Sinkiang and Kansu.

e. Increases of 100,000 tons per year in civil consumption as increased quantities of petroleum products from indigenous sources become available.

The data in Table 1 for 1948 and prior are considered to be correct within a maximum range of plus or minus 10 percent with the exception of imports from the

Soviet Bloc, for which the only firm figure is for one year - 1936. The annual totals for 1949 to 1951 are thought to be within a 20 percent range, but some items may be in error up to 50 percent. The forecasts for 1952 and 1953 are simply judgment estimates based upon the foregoing assumptions.

1. Petroleum Production and Exploration.

Although very insignificant quantities of oil have been produced for hundreds of years in China, the cumulative production to date is less than one million metric tons compared with a cumulative world total of nearly ten thousand million metric tons. The other two Asiatic Satellites of North Korea and Outer Mongolia have no oil production although a prospective oil bearing area is reported in Outer Mongolia near the Sinkiang border.

Reconnaissance geology has indicated about 20 sedimentary basins in the Asiatic Satellites which are worth investigating for possible oil deposits. With the exception of one or two in Outer Mongolia, all of these basins are in China. Geological conditions are unfavorable for oil occurrence in North Korea.

On the basis of limited geological studies to date, 5 sedimentary basins, as listed in Table 2, are considered favorable for oil exploration.

Three additional basins, Turfan Basin in Sinkiang, Tsaidam Basin in Sikang, and South Kansu Basin in Kansu, all in northwest China may also be favorable for oil exploration based on what is known of the general geology of this region. In addition there are possible oil bearing areas in Manchuria, although tests there by the Japanese were unfavorable.

The Red Basin of Szechwan covering most of the province of Szechwan has been studied intermittently for the past 30 years for evaluation of its petroleum possibilities. 17/ For over 2000 years salt, evaporated from brine produced from wells drilled in the Red Basin, has been the most important mineral produced in this

TABLE 2

Favorable Prospective Oil Basins in China

Basin, Province and oil indications	Area Sq. Mi.	Crude oil prod. 1951 thous. tons	Estimated Oil Reserves - Million Tons		
			Proved	Probable	Possible
Red Basin; Szechwan Province; Oil seepages & small quantities of oil & gas produced from salt brine wells. Good structures but known geologic section unfavorable. Deep test drilling justified to evaluate section below 5000 feet	60,000	Less than 1000 metric tons from brine wells and hand-dug pits.	0	0	?
North Shensi; Shensi Province; Oil seepages & some oil produced from a few test wells. No good structures but geologic section justified exploration	80,000	1	?	?	20
Tsungari; Sinkiang Province; Tushantzu Oil Field has produced 120,000 tons of oil since discovery in 1938; numerous oil & gas seepages, good structures & favorable geologic section justifies estensive exploration	70,000	33	2	10	400
Tarim; Sinkiang Province; 2 or more "native" oilfields producing small quantities of oil from hand-dug pits; oil & gas seepages plus indications of good structures & a favorable geologic section for western one-third; geology of eastern two-thirds unknown but justifies thorough exploration		Less than 1000 metric tons from "native" oil-fields with hand-dug wells			
Western one-third	70,000	0	0	?	400
Eastern two-thirds	130,000	0	0	0	?
North Kansu: Kansu Province; Laochunmiao Oil Field has produced 840,000 tons of oil since discovery in 1939; oil and gas seepages, good structure & favorable but limited geologic section; additional exploration fully justified.	40,000	150	3	20	50
Totals	450,000	184	5	30	870

region. The annual production of salt has reached 300,000 tons, meeting a large part of China's demand for this product. Chinese historical accounts indicate that natural gas has been produced with the brine in some wells for nearly 2000 years, and small quantities of oil have been mentioned as coming with the gas and brine for the past 500 years. 18/ In addition, some natural oil seepages occur in the Red Basin. These favorable indications of commercial oil deposits are somewhat offset by an unfavorable geologic section, insofar as it has been mapped or tested. However, some good structures have been mapped, and test wells of 5000 feet or more to explore the deeper sedimentary beds assumed to be present, are fully justified from a geological standpoint. Economically the discovery and development of commercial oil deposits in the Red Basin of Szechwan would be more valuable to China than oil deposits in any one of the other four basins considered herein. There is a relatively large local demand for petroleum products in the Chungking-Chengtu area and the Yangtse River provides relatively good transport to the coastal region and Shanghai.

The North Shensi basin in Shensi province lies some 500 miles northerly from the Red Basin of Szechwan and is in the same major geosyncline. These two basins were separated by a transverse mountain range formed by an uplift in the early Permian so that the sedimentary beds laid down since that time are completely different in the two basins and are of non-marine origin in the North Shensi Basin. Numerous oil seepages occur in this basin, and since 1906 occasional test wells have shown initial yields up to 60 barrels of oil per day, indicating the presence of marine source beds underlying the non-marine series. However, structural conditions as revealed by surface geology are unfavorable for large, highly productive deposits.

This probably accounts for the small discovery wells in this basin and the rapid decline of production from such wells. 19/ Additional investigations, including geophysical surveys, are warranted in the North Shensi basin in order to evaluate more fully the structural conditions there.

Three basins in northwest China, Tzungari, Tarim, and North Kansu, are the most important present and prospective sources for petroleum in China. The first two are in the province of Sinkiang and the third one in the adjoining province of Kansu. Two oil fields, the only commercial fields in China by western standards, occur in this region, one in the Tzungari basin and the other in the North Kansu basin.

The first commercial oilfield developed in China was in the Tzungari Basin of Sinkiang in 1938 when an estimated 2500 tons of crude oil was produced from a few shallow wells, 120 to 360 meters deep, drilled with a small drilling rig and personnel brought in from the USSR 20/. This discovery of the Tushantzu Oil Field near Wusu was the climax of oil prospecting operations by the USSR in Sinkiang starting in 1935 under an agreement with the Sinkiang provincial governor. By 1943 about 30 wells had been drilled and an estimated 40,000 tons of crude oil produced and processed in a small refinery built at the field by the Russians. In 1943 the pro-Communist governor of Sinkiang was replaced with a Nationalist Chinese appointee and the Russians capped the wells, dismantled the equipment including the refinery and withdrew from Sinkiang. In 1944 the Chinese Nationalists restored a few wells to intermittent production which was processed in a "native" refinery capable of handling

25X1

25X1

6 tons per day.

25X1

it is believed that this Tushantzu Oil Field and small refinery operated throughout the period 1944-1949 supplying local demands for petroleum products. 21/ In March 1950 a Sino-Soviet agreement was signed providing for the development of the petroleum resources of Sinkiang by the USSR and very active developments have been reported since that time with reference to oil and other minerals including Uranium. 22/ 23/ It is estimated that about 120,000 tons of oil have been produced from the Tushantzu Field to 1 January 1952, with 1951 production estimated to be 33,000 metric tons, and proved reserves of at least 2 million metric tons.

Along the southern side of the Tzungari Basin, in the same structural trend with the producing Tushantzu anticline, a number of other favorable structures have been noted and two of them have been briefly described. 20/ Although no tests have been drilled on these structures, the proved production at Tushantzu, plus numerous oil seepages along the south edge of the Tzungari basin where the oil reservoir rocks outcrop, indicate probable reserves of not less than 10 million tons for these known structures on the south side of the basin. In view of the favorable geologic conditions (source rocks, reservoir rocks, structural conditions and oil seepages) it is reasonable to assume that an adequate program of exploration comprising geological and geophysical surveys and numerous test wells, will reveal oil reserves comparable to those discovered in similar sedimentary basins in the United States. For the 70,000 square miles of the Tzungari Basin, the possible potential reserves are of the order of 400 million tons on this basis, or about ten times the current

annual oil production of the USSR. Possible reserves of this magnitude would comprise a valuable addition to the oil reserves of the adjoining Soviet Union.

The Tarim Basin in Sinkiang is the largest prospective oil-bearing basin in China. Preliminary investigation has revealed a section of several thousand meters of sedimentary beds exposed around the western part of the basin. Most of the section is reported as being of marine origin and including source rocks and reservoir rocks suitable for the origin and accumulation of oil. Structural folds have been identified at two localities near Kan and Tarlak on the northern side of the basin. It is likely that many more surface evidences of suitable structures can be found around the northern and western sides of the basin and geophysical methods might reveal numerous hidden structures within the basin, particularly in the western one-third. By far the most significant known indications of commercial oil deposits in the Tarim Basin are the oil seepages and shallow wells and pits which have yielded illiminating oils for local consumption for hundreds of years. Two such "oilfields" near the ancient caravan route from Turfan to Kushgar, have been briefly described. 20/ The Kan field north of Kucha comprises about 20 hand-dug wells up to 70 feet deep in which salt water and oil accumulates and from which the oil is intermittently recovered by skimming and bailing. The Tarlak field north of Aqsu is another small native enterprise from which oil is recovered from hand-dug pits. Other oil seepages west of Kashgar and southwest of Yarkand have been mentioned as sources of illuminating oil for local use. Although the total production from these native oil fields around the north and west sides of the Tarim Basin probably does not exceed 5 or 10 metric

tons of oil annually, the occurrence of these active oil and gas seepages is strong evidence of commercial oil deposits in this part of the basin, comprising about one-third of the total area, or 70,000 square miles. This is equal to the entire area of the Tzungari Basin and the possible potential oil reserves are of the same order of magnitude or 400 million tons. The eastern two-thirds of the Tarim Basin is covered by the drifting sand dunes of the Takla Makan desert, described as one of the most desolate and barren spots on earth. Geologic conditions are unknown, but because of the known favorable conditions for oil in the western part of this basin, as well as in the Tzungari Basin to the north and in the North Kansu basin to the east, this vast area is good prospective oil territory. Comprehensive geological and geophysical surveys, probably followed by extensive structure drilling, will be necessary in order to evaluate the oil prospects of this 150,000 square miles in the Tarim Basin. 20/ 24/

The North Kansu Basin lies immediately east of the Tarim Basin, being separated by a low divide. In some classifications it is included as an eastern extension of the Tarim Basin. 25/ It is a long, narrow basin comprising the northwestern half of the so-called Kansu corridor connecting Sinkiang with China proper. About 175 miles from the Sinkiang border on the highway southeast through the province of Kansu, is the city of Yumen and some 35 miles beyond Yumen to the southeast is the Laochummiao Oil Field, the largest oil-field in China with a cumulative production 25X1 to 1 January 1952 of about 840,000 tons of oil.

25X1 [redacted] the Laochummiao Oil Field was discovered by the Chinese Nationalists in 1939 in their effort to develop indigenous sources for

petroleum products. 12/ The discovery well was completed in a shallow zone at a depth of 82 meters. By 1941 a total of 7 wells had been completed in this shallow zone, but productivity was low and all these shallow wells were abandoned in 1942 after producing a total of 4,400 tons of oil. In 1941 a deeper zone was discovered 25X1 at 433 meters, and a total of 25 wells had been completed by 1947

25X1

Seven additional wells were completed in 1948 and about 30 since that time to make a total of 55 wells completed in the deeper zone to 1 January 1952. 26/ 3/ Some of these wells may have been completed in a third zone reported to have been discovered in 1948 at a depth of 740 to 1300 meters. 27/ Production in 1951 is estimated at 150,000 metric tons and about one-half of the 1100 acres proved area has been drilled. 11/ The remaining proved reserves in the exploited zones of the Laochunmiao Field are 25X1 estimated to be 3 million tons.

Recapitulating the 5 sedimentary basins in China in which positive evidence of oil is known to exist and in which full-scale exploratory operations are justified:-

Total area 5 basins --- 450,000 square miles
Number of proved oil fields --- 2
Cumulative production to date --- 960 thousand metric tons
Estimated reserves - millions metric tons -

Proved	5
Probable	30
Possible	870

It is significant that commercial production and proved reserves as well as most of the prospective oil reserves in China occur in the far northwest provinces of Sinkiang and Kansu. This area is relatively inaccessible from the densely populated regions of China but it adjoins the USSR with whom it has economic, racial, cultural and political ties.

Table 3 shows the production by years of the Tushantzu and Laochunmiao Oil Fields, the only fields in the Asiatic Satellites.

Table 3. Estimated crude oil production in the Asiatic Satellites by years and production forecast for 1952-53.

TABLE 3.

Estimated Crude Oil Production in the Asiatic Satellites by Years and Production Forecast for 1952-53

Thousand Metric Tons

Year	Tushantzu Field Sinkiang	Laochunmiao Field Kansu	Total
1938	3	0	3
1939	7	1	8
1940	6	2	8
1941	10	17	27
1942	11	55	66
1943	4	63	67
1944	2	69	71
1945	2	66	68
1946	2	70	72
1947	2	51	53
1948	2	73	75
1949	2	100	102
1950	26	116	142
1951	33	150	183
1952	60	175	235
1953	120	225	345

2. Petroleum Refining.

There are indications that illuminating oil has been distilled in small quantities in native stills for many years, possibly for hundreds of years, in China. However, the few modern oil refineries in China have been built and operated principally by foreigners. Following their occupation of Manchuria in 1932 the Japanese built refineries, shale oil plants, and synthetic liquid fuel plants in that region, to produce petroleum products from imported crude, oil shale and coal. After their discovery of the Tushantzu Oil Field in Sinkiang in 1938, the Russians built a refinery there and operated it on crude oil from that field. The only case of full-scale petroleum production and refining operations by the Chinese without continuous foreign supervision, is the Laochunmiao Oil Field and refinery near Yumen in Kansu Province. 25X1

25X1

Table 4 summarizes available information on petroleum refineries in China. Insofar as the data reveal, there are only 2 full-scale petroleum refineries currently operating at capacity in the Asiatic Satellites. Both are in the far northwest region of China (Sinkiang and Kansu provinces) and are under Russian supervision, processing oil produced there. Two small, inconsequential refineries are listed in Table 4 in Shensi and Szechwan Provinces. Although larger than other native stills, they are probably representative of numerous small batch stills operating in China on oil recovered from oil seepages or shallow wells, and producing minor quantities of petroleum products for local use. One or more of the 3 refineries in Manchuria shown in Table 4 may be operating

TABLE 4

Petroleum Refineries in China a/

Country-Province; Plant, name, location and process; present (1951) status	Production of petroleum products Thousand Metric Tons					
	Maximum Annual Production		Estimated Annual Production b/		Annual Production Forecast	c/
	Year	Quantity	1950	1951	1952	1953
Sinkiang - Tushantzu Field Refinery near Wusu. Simple continuous distillation unit probably enlarged in 1951.	1950	25	25	28	50	100
Kansu - Laochunmiao Field Refinery near Yumen. Continuous combination distillation and cracking unit expanded in 1950-51.	1950	90	90	120	150	200
Shensi - Yenchang Field Small shell still built in 1911. Kerosine only produced in 1951.	1951	1	1	1	2	2
Szechuan Unconfirmed report gives refinery at Ch'ung-Ch'ing with throughput at rate of 3 thousand metric tons annually, June-Sept. 1950.	1950	1	1	?	?	?
Manchuria - Liaoning; Chin-hsi Refinery, Hulutao. Topping plant and other facilities scheduled to start in 1950 on imported crude. Present Status unknown.	1943	15	?	?	?	?
Manchuria - Kwantung-Dairen. A modern Japanese pre-war refinery of 150,000 tons annual capacity was reported operating on imported crude in 1949. A smaller refinery completed in 1945 to process 50,000 tons annually of shale oil was also reported operating on crude oil imported from western sources in 1949. Present status unknown.		150	?	?	?	?
		50	?	?	?	?
25X1 Totals			115	149	202	302

b/ Estimated annual production for Tushantzu and Laochunmiao believed within 25% correct. Nominal estimates shown for Shensi and Szechuan may be grossly erroneous but the quantities are small. There is probably some current production from Manchurian refineries, but there is no basis for making estimates.

c/ Production forecasts are estimated on basis of assumptions given in Summary and Conclusions.

on crude oil imported from the Soviet Bloc, but it is reasonable to assume that practically all of such imports are selected refined products rather than crude oil. At any rate these 3 refineries represent excess petroleum refining capacity under the existing embargo, of up to 200,000 tons annually.

A refinery at Gensan, near Wonsan in North Korea, had a rated pre-war capacity of 250,000 tons of crude oil annually. It operated on imported crude. It was reported as being worn out and obsolete in 1946 and was reported destroyed in 1950 by bombing shortly after the Korean war started. 45/

Following their discovery of the Tushantzu Oil Field in Sinkiang in 1938, the Russians built a refinery at that site to process the oil. When the Russians moved out of Sinkiang in 1943 they capped the wells and dismantled and removed all equipment, including the refinery. However, they left a small batch still, capable of handling about 6 tons of oil daily which the Chinese Nationalists operated on oil produced from a few flowing wells in the Tushantzu Field, which they uncapped. Following the defeat of the Chinese Nationalists in 1949 the Russians returned to Sinkiang and re-opened the Tushantzu Field under a Russian dominated company formed for developing the oil resources of Sinkiang, in accordance with the terms of the Sino-Soviet Agreement of March 1950. There is considerable evidence that the oil resources of northwest China in Sinkiang and the adjoining province of Kansu are being aggressively developed, and it is assumed that adequate refining facilities have been installed by the Russians at or near the Tushantzu Field to process oil produced in that area. Based upon the estimated crude oil production of 33,000 tons in 1951 from the Tushantzu Oil Field, the petroleum products from this source are estimated to be 28,000 tons in 1951.

The Laochunmiao Oil Field and refinery near Yumen in Kansu province is the only example of full-scale petroleum production and refining operations by the Chinese without continuous foreign supervision. Following the discovery of the field in 1939 a shall and pipe still refinery was built with a crude oil capacity of 4000 barrels per day, equivalent to 200,000 metric tons annually. However, it never operated at more than 50% of its throughput capacity and residue ran as high as 70% of the crude oil input. Some of this residual oil was used locally but a large part of it, containing valuable lube stock, was dumped in the Shih Yu River. 21/ This original refinery was partly destroyed by fire and a small combination continuous distillation and cracking plant was installed and on test operation in 1947. It was designed for an input of 2000 barrels per day of crude oil, equivalent to 100,000 metric tons annually. The crude oil was to be topped with a yield of 40 percent distillates (including 20% straight-run gasoline) and the remainder was cracked for additional gasoline. After the area was taken over by the Chinese Communists the USSR sent in technicians to aid the Chinese in the operation of the Laochunmiao Field and refinery 33/. In 1950 the Soviets installed a vacuum distillation and de-waxing plant and additional tankage, thereby increasing the range and quality of petroleum products, and they started construction of a plant for reduction of heavy residual oil to increase further the quantity of such products. The crude oil input is estimated to have been 150,000 tons in 1951, and the output of petroleum products at 120,000 tons.

There is a small refinery in the so-called Yenchang Field in Shensi Province built about 40 years ago by the Standard Oil Company of New York (now Socony-Vacuum) to process crude oil produced from test wells drilled in that area. The wells were small

and the entire operation was abandoned as non-commercial. However, the refining equipment was not removed and has been operated intermittently by the Chinese, as small quantities of crude oil from local sources accumulated. During World War II the Chinese Communists produced some gasoline and kerosine in this refinery, and a recent report states kerosine was refined in 1951 from crude oil produced from a test well which started producing in June 1951. 28/ There are no quantitative data on this operation but from past records of test wells in this area it is not believed that the production of petroleum products from wells in this area will exceed 2 thousand tons annually by 1953.

In Szechuan Province small quantities of oil produced from salt brine wells and other minor sources, have been processed in native stills for many years. An unconfirmed report mentions a refinery operating at Ch'ung-Ch'ing (Chungking?) in the summer of 1950 at a rate of 3 thousand tons annually. This is believed to be a substantially higher rate than other native stills in the region. It probably operates intermittently as crude oil accumulates.

In Manchuria, the Chin-hsi Refinery near Hulatao in Liaoning province was built by the Japanese with a capacity of 125,000 tons annually of crude oil, and was operated on imported crude discharged from tankers at the port of Hulatao and thence to the refinery by pipeline. It comprised a pipe-still and fractionating unit, a thermal cracking unit, a continuous sulfuric acid treating unit, and a re-run still. This refinery was largely dismantled by the Soviets after World War II but was later restored to operate at about 50% of its pre-war capacity, or 60,000 tons annually. It was

scheduled to go on stream in 1950 on imported crude. Undoubtedly the embargo on imports of petroleum into China has adversely affected the operation of this refinery but its present operating status is not known.

At Dairen in Kwantung province, Manchuria, the Japanese built a petroleum distillation and cracking plant in 1935 with a capacity of 150,000 tons annually. One report indicates the ultimate capacity was 250,000 tons annually of crude oil and a cracking capacity of 100,000 tons annually. The Japanese operated the refinery on imported crude oil and it is believed to be now operated by the Russians on Sakhalin crude, although Dairen was to have been returned to the Chinese Communists under the terms of the 1950 Soviet-Chinese Communist treaty of friendship and mutual assistance. 12/ 13/

Another small refinery at Dairen was completed in 1945 by the Japanese and was to operate on an input of 100,000 tons annually of shale oil from Fushun. 13/ After World War II it was probably operated by the Russians on imported crude as the Fushun shale plants were dismantled. The present operating status of this plant is not known.

The present capacity and operating status of the 3 petroleum refineries in Manchuria described above, cannot be accurately determined. However it appears certain that there is excess refining capacity in these 3 plants, since the placing of the embargo on shipping petroleum to Communist China, as they are dependent on imported crude.

3. Shale Oil, Synthetic Liquid Fuels, and Petroleum Substitutes.

In 1929 Japanese industrialists undertook the exploitation of the oil shale deposit

at Fushun, Liaoning province, Manchuria. This is a surface deposit overlying coal measures which must be stripped in order to mine the underlying coal. For this reason the cost of mining the oil shale could be charged to the coal, which made the recovery of oil from the shale commercially attractive. The deposit contains 5.4 billion tons of oil shale which is estimated to contain 300 million tons of shale oil. Such reserves are negligible compared to US shale oil reserves in Colorado, but to the Japanese they represented over 50 times their annual petroleum requirements. After Japan occupied Manchuria in 1932 this Fushun oil shale deposit was aggressively developed reaching a production of 125,000 tons of crude shale oil in 1938. 12/ Expansion of retorting facilities in 1942 enabled the Japanese to reach a peak production of 197,000 tons of crude shale oil in 1943, yielding 167,000 tons of petroleum products. 13/

In 1938 the Japanese instigated an extensive program to supplement their liquid fuel supplies by producing synthetic liquid fuels from coal similar to Germany's program. During the next 7 years a total of 7 synthetic plants were built on German designs using the same processes used in Germany. Although these plants had a combined theoretical capacity of nearly 200,000 tons annually, the peak annual production, reached in 1944, was less than 10,000 tons. These plants were generally unsuccessful in operation and were still largely in the experimental stage at the end of World War II. 13/

The Manchurian shale oil and synthetic liquid fuel plants were partly or wholly dismantled by the Russians immediately following World War II. As a result the yield of petroleum products from such plants declined from a World War II peak approaching 200,000 tons annually to less than 10,000 tons annually in 1946. 14/ Limited restoration

of some plants since that time has gradually increased output to an estimated 54,000 tons of petroleum products in 1951. 32/ Table 5 shows data on these shale oil and synthetic liquid fuel plants which have been restored. Although the Chinese Communists announced extensive plans for rebuilding these Manchurian plants for producing petroleum products, relatively little progress has been made despite some technical help from the USSR. It is probable that the Korean War has retarded this reconstruction program in Manchuria, which called for restoration of pre-war industrial levels by 1953. 34/

TABLE 5

Shale Oil and Synthetic Liquid Fuel Plants in China, Operating in 1951

Plant name, location, process and present status	Production of Petroleum Products, Thousands Metric Tons			
	Estimated Annual Production		Annual Production Forecast	
	1950	1951	1952	1953
Fushun Shale Oil Plant, Liaoning province, Manchuria. Peak World War II capacity, 197,000 tons shale oil annually. Can probably be restored to yield about 125,000 tons annually of shale oil yielding 105,000 tons of petroleum products.	30	42	80	90
Kirin Shale Oil Plant and possible synthetic liquid fuel plant. The Japanese built a coal tar hydrogenation plant here with a planned capacity of about 15,000 tons annually. This plant was dismantled by the Russians. A new small shale oil plant was scheduled to start operations in 1950 and an experimental synthetic liquid fuel plant was planned. 29/ 31/	10	12	20	25
Totals	40	54	100	115

Communist China plans to build 3 hydrogenation plants for production of gasoline, including aviation gasoline, using coal as the raw material. In 1951 about 50 tons of coal was shipped from China to the Soviet Zone of Germany for experimental purposes and for plant design by Kraftstaff U. Industriebau, a part of VVB Industrieanwurf. 46/ In January 1952 it was reported that designs for 3 such plants were completed and had been submitted to the Chinese Communist Government. The plants each have a designed capacity of 150,000 tons annually of aviation gasoline, or a total of 450,000 tons annually, according to this report. 47/ It appears unlikely that any of these proposed plants will be completed and producing before 1955.

Petroleum substitutes from agricultural sources are of importance to the Chinese economy when the supply of petroleum products is restricted or shut off as it was during World War II. In 1944 some 6000 tons of petroleum substitutes were produced by 35 registered vegetable oil cracking plants in Nationalist China 35/ and it has been estimated that as much as 25 percent of China's total liquid fuel requirements during World War II were met by petroleum substitutes from agricultural sources. 14/

25X1

petroleum substitutes in China are derived from 8 different vegetable oils all yielding about 30 percent of original volume in liquid fuels ranging from gasoline to diesel oil substitutes, and including some lubricants. These vegetable oil substitutes are claimed to be cheaper than imported petroleum products. 37/ Because of the large number of small plants involved, fluctuations in output and other variables, it is not possible to estimate the current or potential production of petroleum substitutes from agricultural sources. However, under severe

rationing or complete lack of petroleum products, the production of petroleum substitutes can be expanded to meet most of the minimum essential civilian needs in China.

4. Civil Consumption and Distribution.

There are two outstanding characteristics regarding the civil consumption of petroleum products in China and the Asiatic Satellites; first the extremely low per capita consumption, and second, the fact that despite its low level, the normal civilian requirements for petroleum products can be reduced drastically in time of war without seriously reducing the effectiveness of the civilian economy. This reduction can be effected largely by using substitutes for petroleum products obtained from numerous small vegetable oil cracking plants and alcohol plants, and the substitution of manpower for motive power in some transport operations. This was demonstrated in World War II when total consumption declined to 28 percent of the pre-war (1932-37) level as reflected in Table 1.

As shown in Table 1, estimated current civilian consumption of 500 thousand tons annually of petroleum products is about one-fourth that of 1947. 25X1

25X1

Chinese agricultural and industrial output has not been adversely affected by lack of petroleum products due to the Korean war and the embargo on Communist China, which are the primary causes for the current reduction in civilian consumption of such products.

China is essentially an agricultural economy based on human labor. Plans for industrialization proposed by the Chinese Nationalists and more recently by the

Chinese Communists have not yet materialized to the point where scarcity of petroleum products seriously cripples the economy. Lubricants for the railroads and for textile mills appear to be the only critical petroleum products, and the limited quantities needed can be obtained in some manner, from various sources.

Because of disruption of interior transport in World War II, making it impossible to ship coal to Shanghai and other coastal cities, electric power plants in those cities used imported fuel oil in the post-war period. However, when the Chinese Communists obtained control, these plants were converted back to coal, as the transport system had been partly restored, so that imports of fuel oil were drastically reduced in 1949-50.

The majority of transportation in the Asiatic Satellites is still by primitive means. The thin network of railroads and airways and extremely limited motor transport, supplement rather than supplant the ancient methods which have been in use for centuries. 41/ On the China mainland in 1937 there was a total of 54,530 commercial and passenger motor vehicles, and this figure had increased to only 56,030 such vehicles in 1947. 43/ Although diesel power has been used on some Yangtse river boats and other inland waterways vessels, wind power is still predominant and can be resorted to almost exclusively when diesel fuel is not available.

The domestic use of kerosine as an illuminant is well established in the Asiatic Satellites. Imports of kerosine into China in 1935 were 312,000 tons and comprised 35 percent of total imports of petroleum products. Practically the same quantity, or 308,000 tons of kerosine were imported in 1947 but it then comprised only 16 percent of the total. When kerosine is not available it is replaced completely by substitutes from indigenous sources - chiefly vegetable oils. 44/

The geographical consumption of petroleum products in China is concentrated, rather than diffused over the entire country. In 1946-47 it appears that about three-fourths of all petroleum products consumed in China were used in the Shanghai area. With the reduction in the use of fuel oil in electric power plants since that time, the pattern of consumption of petroleum products is somewhat more diffused but is still confined almost entirely to the coastal areas.

TABLE 6

Average Annual Imports of Petroleum Products from Western Sources into China. (Excluding Manchuria) a/

Thousand Metric Tons

Time Interval	Gasoline	Kerosine	Diesel & Fuel oil	Lubricating Oil	Greases	Total
1925 to 1929	47	711	158	34	1	951
1930 to 1933	101	525	237	36	1	900
1934 to 1937	127	341	338	51	1	858
1938 to 1941	93	184	170	33	1	451
1942 to 1945	4	4	4	1	0	13
1946	263	238	313	58	2	874
1947	418	308	1158	58	2	1944
1948	309	130	885	36	2	1362

25X1

Table 6 shows the imports from western sources into China of petroleum products from 1925 to 1948 by products. Imports of petroleum products into Manchuria are not included in Table 6. As indicated in Table 1, such imports into the Asiatic Satellites represented 85 percent to 99 percent of the total supply during the period covered so that Table 6 reflects the historical consumption pattern of petroleum products in

China. In the 1925-29 period kerosine comprised 75 percent of the total imports of petroleum products while in 1948 it comprised only 10 percent of such products. The nearly four-fold increase in diesel and fuel oil imports in 1947 over 1946 is due to converting electric power plants from coal to fuel oil. Since 1947 these plants have been reconverted to coal because of lack of oil. Not enough data are now available to show the consumption by products since 1948.

5. Petroleum Storage.

Petroleum storage at ocean terminals and bulk oil stations in the Asiatic Satellites was equal to about 900 thousand metric tons prior to World War II. Most of this storage is listed in Table 7 which represents petroleum storage in China, Manchuria and Korea north of the 38th parallel as of December 1941.

TABLE 7

Distribution of Petroleum Storage at Ocean Terminals and Bulk Stations as of December 1941 a/

Area or Region	Provinces or Country	Number of Storage Sites	Number of storage tanks	Storage capacity Thous. metric tons
Shanghai area	Kiangsu, Chekiang and Anhusei	26	154	345
Hankow area	Hupeh	8	48	168
Southern China	Fukien, Kwangtung, Hunan, Kiangsi, Kwangsi	24	97	154
Chungking area	Szechwan	3	17	34
Dairen area	Manchuria	4	24	60
Yingkow area	Manchuria	1	7	28
Genzan	N.Korea	1	7	17
	Totals	67	354	806

a/ Table 7 is a recapitulation by areas of data given on pages T-210 to T-214 of Petroleum Facilities of China, Manchuria and Korea, prepared by The Enemy Oil Committee for the Fuels and Lubricants Division, Office of the Quartermaster General, July 1945.

Table 7 does not include storage capacity at about 300 minor oil depots and packaged oil warehouses having an average tank storage capacity of about 100 tons or an aggregate of about 30,000 tons of tank storage.

During World War II total bulk storage in use declined from an estimated pre-war figure of 900,000 tons to only 250,000 tons because of war devastation and lack of maintenance. After the war this storage was restored and rebuilt to a present estimated capacity of 800,000 tons. 44/ It is assumed that the location and capacity distribution of this storage follows the pre-war pattern shown in Table 7, and is believed to be of about the same order of magnitude. Another source estimated petroleum storage in China in 1950 to be 900,000 tons. 48/

Prior to World War II about one-half the petroleum storage capacity in the countries now comprising the Asiatic Satellites was owned by the Socony Vacuum Oil Company. Most of the remainder was owned by the Asiatic Petroleum Company (Shell) and Texas Company, with minor installations owned by a half-dozen native companies. In the post-war period, prior to Communist control, two changes in ownership occurred. The Texas Company's properties were absorbed by Caltex, representing Texas Company and Standard of California ownership, and the Chinese Petroleum Corporation, created by the National Resources Commission, became active in all phases of China's petroleum industry including storage and distribution of products.

In 1951 the Chinese Communist Government took over all foreign oil company properties in China, consisting principally of petroleum storage facilities. Actual stocks of petroleum products in China were estimated to be only 60,000 tons as of September 30, 1950. 36/ This probably represented minimum working stocks, and it is indicated stocks were at the minimum working level when the facilities were confiscated by the

Communist. 49/ 50/

There is no evidence to indicate that stocks of petroleum products in the Asiatic Satellites were above minimum working levels in January 1952. If normal or desirable working stocks are equal to 3 months supply, it is assumed that efforts may be made to raise stocks of petroleum products in the Asiatic Satellites to 200 or 300 thousand tons.